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RDTE Project No. 1L162706A553-TA3-7

TECOM Project No. 3-CO-513-FBT-023

DPG Document No. DPG-S-445A

AN EVALUATION OF ENTOMOLOGICAL WARFARE AS A POTENTIAL DANGER TO THE UNITED STATES AND EUROPEAN NATO NATIONS (U)

By

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March 1981

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SIFIED BY: Multiple Sources
EW ON: 31 March 1997

DPG 81-41

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Table 1. (U) Resource Cost Summary for an *F. tularensis* Aerosol Attack on a Battalion.

Item	Cost (1976 $)
Planning	8,750
Agent Production	10,000
Munition Acquisition	9,897
Weapon Employment	5,700
TOTAL:	34,347

1.5.1.2 (U) Attack with Yellow Fever Infected Mosquitoes. The cost of attacking a 7.5-km² area (battalion) with yellow fever-infected mosquitoes was estimated. Where possible, costs of equipment were taken from 1976 catalogues to make the cost comparison with the aerosol attack as valid as possible. The feasibility of area coverage with *A. aegypti* mosquitoes was based on the Avon Park, Florida mosquito trials described in Section 4 (11,12). Approximately 225,000 infected female *A. aegypti* are required for this hypothetical attack. The mosquitoes would be released from a helicopter 610 m upwind of the target area. Table 2 contains the resource cost summary for this attack. See Table 6 page 46 for the estimated cost of munition items for the *F. tularensis* attack and Table 7 page 49 for the estimated cost of items to raise 225,000 yellow fever infected mosquitoes.

Table 2. (U) Resource Cost Summary for a Yellow Fever-Infected Mosquito Attack on a Battalion.

Item	Cost (1976 $)
Planning	8,750
Agent Production	9,066
Munition Acquisition	2,150
Weapon Employment	6,700
TOTAL:	26,666

(U) Tables 1 and 2 demonstrate the probable cost differential for an aerosol versus EW attack when considering a given limited area such as that occupied by a mechanized battalion in the field. In actuality, an EW attack of this type on a military unit would probably not be attempted because complete control of the airways would be necessary and the attack would not be covert. The same would be true for a pathogen aerosol attack attempted this close to the target area.

1.5.2 City Attack.

1.5.2.1 (U) Attack with Yellow Fever-Infected Mosquitoes. The cost of attacking an urban area covertly with yellow fever-infected mosquitoes was estimated. It was assumed the cost of planning a city attack with yellow fever-infected mosquitoes is comparable with the cost of planning an aerosol attack on Washington, DC (scenario 7 of reference 10). In the present hypothetical attack, 16 simultaneous attacks were planned at a total planning cost of $8,750. The cost of one attack would be $547.00 ($8,750 ÷ 16).

(U) Agent production would involve producing 225,000 yellow fever-infected female *A. aegypti*. This is the same number used in the hypothetical battalion attack so the cost would be the same ($9,066).

(U) Munition acquisition was estimated to be $500.00 and weapon employment (truck rental and wages of two semi-skilled people for eight hours) was estimated to be $360.00. These costs are summarized in Table 3.

Table 3. (U) Resource Cost Summary for a Yellow Fever-Infected Mosquito Attack on a City.

Item	Cost (1976 $)
Planning	547
Agent Production	9,066
Munition Acquisition	500
Weapon Employment	360
TOTAL:	10,473

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(U) The costs of agent production, munition acquisition, and weapon employment were also taken from scenario 7 of reference 10. The one exception to this was for weapon employment. Scenario 7 included the travel and per diem costs of foreign agents traveling to the US to conduct the attack. In the presently described scenario, people to conduct the attack were considered to be already in the US. This makes the costs comparable to those for the yellow fever mosquito attack on a

city where attack personnel were considered to be already in the US. The costs are summarized in Table 4.

Table 4. (U) Resource Cost Summary for an *F. tularensis* Aerosol Attack on a City.

Item	Cost (1976 $)
Planning	547
Agent Production	174,000
Munition Acquisition	1,435
Weapon Employment	3,250
TOTAL:	179,232

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1.5.3 Cost Comparison Summary.

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(U) The closeness of agent and agent vector release in these two types of attacks (610 m upwind of the target area) would preclude the advantage of covertness. Therefore, personnel having access to protective masks during an *F. tularensis* aerosol attack would probably have the opportunity to take advantage of this method of protection.

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(U) It has been estimated that between 50 and 90 percent of a nonimmune population bitten by infected yellow fever mosquitoes will become infected and 30 to 40 percent of the victims will die (12). Thus >50 percent of the personnel in the battalion would likely become incapacitated and a large number would die.

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Table 5. (U) Various Estimates of Cost per Death for an *F. tularensis* Aerosol Attack on a City.

Percent Deaths	Number of Deaths	Cost Per Death (1976 $)
5	62,500	2.86
10	125,000	1.43
20	250,000	0.72
30	375,000	0.48
40	500,000	0.36
50	625,000	0.29

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[1]Streptomycin, kanamycin, and chloramphenicol are also effective against *F. tularensis*, although some strains of *F. tularensis* are resistant to streptomycin.

SECTION 3. INTELLIGENCE INFORMATION (U)

(U) Since World War II several reports have indicated the Soviet Union has an interest in EW.

3.1 HIRSCH REPORT

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(U) The prisoners, reportedly in chains, were placed in an eight-man tent which had a number of plague-infected rats and fleas under wire nets on the floor. Most of the prisoners developed bubonic plague after being bitten by the fleas. Ground squirrels and other rodents were reported to have been used in similar experiments and proved to be efficient intermediary hosts. The escape of a prisoner infected with bubonic plague started a great epidemic among the Mongols in the summer of 1941. Three to five thousand Mongols were reported to have died in this epidemic and were disposed of by burning or burying with disinfectants.

(U) Ticks were also reported to have been used to transfer tick-borne encephalitis to prisoners. In addition, infected fleas and other insect vectors were dropped from aircraft in paper containers.

3.2 MASS PRODUCTION OF *AEDES AEGYPTI*

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SECTION 4. HISTORY OF EW FIELD TESTING IN THE US (U)

4.1 OPERATION BIG ITCH (8,12)

(U) In 1954 a series of trials was conducted using *Xenopsylla cheopis* (fleas) in E-14 munitions with cardboard and sponge inserts. The insects were dropped from altitudes of 305 and 610 m over US Army Dugway Proving Ground (DPG), Utah to: (1) investigate the suitability of the munition components for dissemination of these arthropod vectors; (2) determine survival and host acquisition ability of *X. cheopis* disseminated from these devices; (3) plot carrier patterns produced by E-14 munitions filled with the special carriers.

(U) The fleas were successfully reared to the appropriate stage, then dropped on the target with little or no die-off. After release, the insects were successful in acquiring hosts but were not active longer than 24 hours. The sponge carriers were the most widely distributed, as indicated by carrier patterns.

(U) No calculations of effects were attempted in this report.

4.2 OPERATION BIG BUZZ (12,14)

(U) In May 1955 a field test was conducted in Georgia to (1) demonstrate the feasibility of mass-producing, storing, loading into munitions, and disseminating mosquitoes from aircraft, and (2) to determine if the mosquitoes would survive the airdrop and take blood meals from humans.

(U) More than one million uninfected *A. aegypti* were produced and stored for nearly two weeks. About one third of these mosquitoes were placed in E-14 munitions (containing "aircomb waffles" and "loop tubes") and in 0.76 m rocket-shaped ground release munitions, and dropped, without mortality, from aircraft. The remaining mosquitoes were used in munition loading and storage tests. Mosquitoes were released from E-14 munitions when they were 91 m above the ground. The mosquitoes were dispersed by the wind and their own flight and were collected as far as 610 m downwind from the target release site. The female mosquitoes were active in seeking blood meals from humans and guinea pigs.

4.3 OPERATION DROP KICK (12,15)

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4.5 OPERATION MAY DAY (12,17)

(U) Operation MAY DAY consisted of studies of *A. aegypti* activity and dispersion in an urban area (Savannah, Georgia) from April to November 1956.

(U) The tests were designed to give information on the dispersal of *A. aegypti* from a ground level point-source release in a short period of time. Results were based primarily on mosquito recoveries obtained in dry-ice baited traps. In these tests a small fraction (0.5 percent to 7.75 percent) of the total number of mosquitoes

SECTION 7. CONCLUSIONS AND RECOMMENDED DEFENSIVE MEASURES

7.1 CONCLUSIONS

(U) Intelligence information gathered about the Warsaw Pact countries indicates that in the past, they have attempted development of an EW capability. Indirect evidence, e.g., mass rearing of potential insect vectors and working with microbiological agents compatible with EW that are not a problem in these countries, comprises the evidence available to indicate present activity in this area. The Warsaw Pact nations certainly have the capability to conduct EW.

(U) The *A. aegypti*/yellow fever virus system is estimated to be the most likely antipersonnel EW system that could be used by the Warsaw Pact countries against the United States or the European NATO nations. Foot and mouth disease virus is a likely animal EW agent that could be effectively spread by *M. domestica*.

(U) In the magnitude of the city attack scenarios described in this report, i.e., 16 simultaneous attacks on urban areas, the *A. aegypti*/yellow fever virus EW attack system was estimated to be less cost effective than the *F. tularensis* aerosol mode of attack in casualties produced, but it may be more cost effective when considering mortalities produced. The *A. aegypti*/yellow fever virus attack system becomes more cost effective in relation to the *F. tularensis* aerosol attack mode if the magnitude of the attack becomes smaller, and less effective when the magnitude becomes greater. The *A. aegypti*/yellow fever virus EW attack system also requires less expertise to develop and employ than the *F. tularensis* aerosol system

(U) EW systems are not likely to be employed on military units because the agent vectors must be released too close to the target area. This would make a covert attack on a military unit very difficult to achieve. EW could be very effectively used against civilian urban populations or it could be used to cause great economic losses in the cattle and livestock industry.

7.2 RECOMMENDED DEFENSIVE MEASURES

(U) When an EW attack on a city is suspected or when a large population of mosquitoes or other insects unexpectedly appears in an abnormal way, reaction must be swift. Insecticide spray operations should be initiated as soon as possible. At the same time, the general population must be warned by radio, television, and newspapers. If the insects are mosquitoes the warning should include advice to stay indoors and the keep unscreened doors and windows closed at all times. Those who must venture outside should be protected as much as possible. Suggested protection should include wearing mosquito netting over face

and neck and the use of mosquito repellant. Long sleeve shirts with gloves tightly fastened around the wrists should be worn. Pants should be fastened tightly around the ankles and two pairs of socks worn. Hats should be worn to protect the tops of heads.

(U) Where possible, insecticide spraying should be started in individual dwellings. In the event of an EW plague attack, people should be assured that it is treatable and in the event of plague symptoms, antibiotic treatment must not be delayed. If sufficient evidence is available that a plague flea attack has occurred, and if sufficient antibiotics are available, antibiotic treatment of flea-bitten individuals might even be given before the appearance of symptoms.

(U) Panic is one of the most important things to prevent in the event of an EW attack on the general population. People must be assured that, ordinarily, the best procedure for them to follow is not to flee the area but to stay and receive proper treatment, or if mosquitoes are the vector, to stay inside and stay protected.